

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,001,471 B2
APPLICATION NO. : 09/386734
DATED : February 21, 2006
INVENTOR(S) : Thomas L. Ritzdorf et al.

Page 1 of 4

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On The Title Page, Item (56)

References cited, please insert the following Information Disclosure Statements allowed by the Examiner on 12/17/01:

--Mak, C.Y., "Electroless Copper Deposition on Metals and Metal Silicides,"
Materials Research Society Bulletin. (August 1994).

Hogan, B.M., "Microstructural Stability of Copper Electroplate," (citation
unknown but believed to be published more than one year before the date of this
application).

Stoychev, D., Vitanova, I. Vieweger, U., "Influence of the Inclusions in Thick
Copper Coatings or Their Physico-Mechanical Properties,"
CHECK REFERENCES

Stoychev, D.S., and Aroyo, M.S., "The Influence of Pulse Frequency on the
Hardness of Bright Copper Electrodeposits," *Plating & Surface Finishing*, pp.
26-28 (date unknown but believed to be published more than one year before
the date of this patent application).

Stoychev, D.S., and Aroyo, m.S., On the influence of Pulse Frequency on the
Hardness of Bright Copper Electrodeposits, (citation unknown but believed to
be published more than one year before the date of this patent application).

Stein, B., "A Practical Guide to Understanding, Measuring and Controlling
Stress in Electroformed Metals," presented at the AESF Electroforming
Symposium, Las Vegas, NV (March 1996).

Sanchez, J. Jr., Besser, P.R., and Field, D.P., "Microstructure of Damascene
Processed AlCu Interconnects for Integrated Circuit Applications," presented at
the Fourth International Workshop on Stress Induced Phenomena in
Metallizations, Tokyo, Japan (June 1997).

Sanchez, J. Jr. and Besser, P.R., "Modelling Microstructure Development in
Trench-Interconnect Structures," submitted to International Interconnect
Technology Conference, Sunnyvale, CA (June 1998).

Field, D.P., Sanchez, J. Jr., Besser, P.R., Dingley, D.J., "Analysis of Grain-
Boundary Structure in Al-Cu Interconnects," *J. Appl., Phys.*, 82(5) (September
1, 1997).

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,001,471 B2
APPLICATION NO. : 09/386734
DATED : February 21, 2006
INVENTOR(S) : Thomas L. Ritzdorf et al.

Page 2 of 4

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On The Title Page, Item (56) (cont'd)

Gupta, D., "Comparative Cu Diffusion Studies in Advanced Metallizations of Cu and Al-Cu Based Third Films," Materials Research Society Symposium Proceedings, San Francisco, CA (April 1994).

Megaw, H.D., and Stokes, A.R., "Breadths of X-Ray Diffraction Lines and Mechanical Properties of Some Cold-Worked Metals," *J. Inst. Metals*, vol. LXXI, pp. 279-289 (1944)

Thompson, C.V., and Knowlton, B.D., "Designing Circuits and Processes to Optimize Performance and Reliability: Metallurgy Meets Tcad," *Microelectronics and Reliability*, 36, P. 1683 (1996).

Carel, R., Thompson, C.V., Frost, H.J., *Material Research Society Symposium*, Vol. 343, Materials Research Society (1994).

Floro, J.A., Carel, R. and Thompson, C.V., "Energy Minimization During Epitaxial Grain Growth Strain vs. Interfacial Energy," *Material Research Society Symposium*, Vol. 317, Materials Research Society, (1994).

Plötner, M., Urbansky, N., Preusz, A. and Wenzel, C., "Control of Mechanical Stresses and their Temperature Dependence in PVD CU Films," presented at Adv. Metalliz. & Interconn. Syst. ULSI Applic. San Diego (1997).

Wong, Chee. C., Smith, H.I., and Thompson, C.V., "Secondary Grain Growth and Graphoepitaxy in Thin Au Films on Submicrometer-Period Gratings," *Material Research Society Symposium Proc*, Vol. 47, Materials Research Society (1985).

Thompson, C.V., and Smith, H.I., "Secondary Grain Growth in Thin Films." *Material Research Society Symposium Proc.*, Vol. 57, Materials Research Society (1987).

Wong, C.C., Smith, H.I., and Thompson, C.V., "Room Temperature Grain Growth in Thin Au Films," from *Grain Boundary Structure and Related Phenomena*, supplement to *Transactions of Japanese Institute of Metals*, 27, p. 641 (1986).

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,001,471 B2
APPLICATION NO. : 09/386734
DATED : February 21, 2006
INVENTOR(S) : Thomas L. Ritzdorf et al.

Page 3 of 4

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On The Title Page, Item (56) (cont'd)

Thompson, C.V., "Observations of Grain Growth in Thin Films," from *Microstructural Science for Thin Film Metalizations in Electronics Applications*, eds. J. Sanchez, D.A. Smith and N. DeLanerolle, The Minerals, Metals & Materials Society (1985).

Frost, H.J., Thompson, C.V., and Walton, D.T., "Abnormal Grain Growth in Thin Films Due to Anisotropy of Free-Surface Energies," *Materials Science Forum*, Vols. 94-96, pp. 543-550, Trans Tech Publications, Switzerland (1992).

Frost, H.J., Thompson, C.V., "Microstructural Evolution in Thin Films," presented at the Symposium on Computer Simulation of Microstructural Evolution, Toronto, Canada, October 15 (1988).

Frost, H.J., Thompson, C.V., and Walton, D.T., "Grain Growth Stagnation and Abnormal Grain Growth in Thin Films," presented at TMS-AIME Fall Meeting, Indianapolis, IN (1989).

Reed-Hall, et al, "Physical Metallurgy Principles," pp. 270, 287 and 287, 83rd Ed. (1991).

Stoychev, D.S., and Aroyo, M.S., "On the Influence of Pulse Frequency upon the Hardness of Bright Copper Electrodeposits," (citation unknown but believed to be published more than one year before the date of this patent application).

Frost, H.J. and Thompson, C.V., "Modeling of Optical Thin Films," reprint from Proceedings of SPIE (International Society for Optical Engineering, San Diego, CA 1987, printed by the Society of Photo-Optical Instrumentation Engineers (1988).

Walton, D.T., Frost, H.J. and Thompson, C.V., "Computer Simulation of Grain Growth in Thin Film Interconnect Lines," *Mat. Res. Soc. Symp. Proc.*, vol. 225 (1991).--

Column 3

Line 61, delete "disclosed method.";

Column 17

Line 62, "microstructues" should be --microstructures--;

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,001,471 B2
APPLICATION NO. : 09/386734
DATED : February 21, 2006
INVENTOR(S) : Thomas L. Ritzdorf et al.

Page 4 of 4

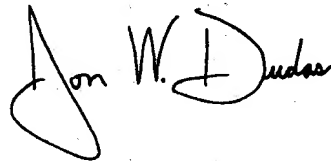
It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 20

Line 57, "topper" should be --copper--;

Signed and Sealed this

Fourth Day of September, 2007

A handwritten signature in black ink, reading "Jon W. Dudas". The signature is stylized, with a large loop for the "J" and a cursive "Dudas".

JON W. DUDAS
Director of the United States Patent and Trademark Office